UNITED STATES PATENT AND TRADEMARK OFFICE

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/774,646	02/01/2001	Kiyoharu Aizawa	106502	8333

25944 7590 08/24/2004	EXAMINER
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ALEXANDRIA, VA 22320

DATE MAILED: 08/24/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

-- *The MAILING DATE of this communication appears on the cover sheet with the correspondence address* --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE _3_ MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.
- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
  Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on _____.

2a)☐ This action is **FINAL**.   2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) _1-20_ is/are pending in the application.

    4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) _1-3,5 and 10-17_ is/are rejected.

7)☒ Claim(s) _4,6-9 and 18-20_ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on _26 April 2001_ is/are: a)☒ accepted or b)☐ objected to by the Examiner.

    Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

    Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

    a)☒ All   b)☐ Some * c)☐ None of:

      1.☒ Certified copies of the priority documents have been received.

      2.☐ Certified copies of the priority documents have been received in Application No. _____.

      3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

    * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)

2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
    Paper No(s)/Mail Date _____.

4) ☐ Interview Summary (PTO-413)
    Paper No(s)/Mail Date. _____ .

5) ☐ Notice of Informal Patent Application (PTO-152)

6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 102

1.   The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the

basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

1.   **Claims 1, 11, and 12 are rejected under 35 U.S.C. 102(b) as being anticipated by**

Kubota et al. (IEICE 1999).

In regard to claim 1, Kubota et al. (IEICE 1999) discloses an arbitrarily focused

image synthesizing apparatus comprising:

a first filter (see figure 4, element Ka) for converting a first image that is

in focus in a first portion based on a given first blur parameter (see page 6, last

line to page 7 first line);

a second filter (see figure 4, element Kb) for converting a second image

that is in focus in a second portion based on a given second blur parameter (see

page 6, last line to page 7 first line); and

a synthesizer (adder) for synthesizing output of said first filter and output

of said second filter and generating an arbitrarily focused image (see page 6, last

line to page 7 first line).

In regard to claim 11, Kubota et al. (IEICE 1999) discloses the arbitrarily focused

image synthesizing apparatus according to claim 1, wherein said first filter has

characteristic as follows (see section 5.1, equation 23),

$$K_a(\xi, \eta) = \begin{cases} \dfrac{R_1^2 + R_2^2 - R_a^2}{R_1^2 + R_2^2}, & \xi = \eta = 0 \\ \dfrac{H_a - H_b H_1}{1 - H_1 H_2}, & \text{otherwise} \end{cases} \quad (23)$$

said second filter has characteristic as follows (see section 5.1, equation 24),

$$K_b(\xi, \eta) = \begin{cases} \dfrac{R_1^2 + R_2^2 - R_b^2}{R_1^2 + R_2^2}, & \xi = \eta = 0 \\ \dfrac{H_b - H_a H_2}{1 - H_1 H_2}, & \text{otherwise} \end{cases} \quad (24)$$

wherein R1, R2, Ra, Rb represent blur radius and H1, H2, Ha, Hb

represent blur function, and said synthesizer adds output of said first filter to

output of said second filter.

In regard to claim 12, Kubota et al. (IEICE 1999) discloses the arbitrarily focused

image synthesizing apparatus according to claim 11, therefore, it is inherent that the blur

radiuses are capable of being selected so that square differential value between an

unblurred image and an image subjected to a Gaussian filter is minimized.

2.   **Claims 13, 15, and 16 are rejected under 35 U.S.C. 102(b) as being anticipated by**

Kinjo, US 6,583,811.

In regard to claim 13, Kinjo, US 6,583,811, discloses an arbitrarily focused image

synthesizing apparatus comprising:

a determinator for arranging, in focal point order, first to Nth images

wherein first to Nth portions, respectively (see column 4, lines 26-40), are in

focus based on first to Nth given blur parameters, and determining whether or not

one portion in an i'th image that is one of those images is in focus in a plurality of

images in front and back thereof taking that i'th image as center (see column 7, lines 16-22);

a comparator for comparing determination patterns of said determinator to determine which images that portion is in focus in (see column 7, lines 16-22); and

a synthesizer for synthesizing said first to Nth images according to comparison results from said comparator and generating a completely focused image (see column 7, lines 22-30).

In regard to claim 15, Kinjo, US 6,583,811, discloses a plural image simultaneous capturing camera comprising:

a camera element (see figure 1, element 11);

a processor (see figure 1, element 12) for receiving signals from said camera element and converting it to image data;

a display unit (see figure 1, element 21) for displaying image data processed by said processor;

a focal point designator for designating a plurality of subjects inside an image and requesting a plurality of images having respectively differing focal points (see column 4, lines 29-33);

a focal point adjustment mechanism for setting focal point positions using the designation of said focal point designator (see column 4, lines 33-35); and

a memory (see figure 1, element 16) for storing image data, wherein said processor respectively and in order focuses said plurality of subjects designated,

respectively captures those subjects, and respectively stores in said memory plural

image data which has been obtained (see column 4, lines 35-40).

In regard to claim 16, Kinjo, US 6,583,811, discloses the plural image

simultaneous capturing camera according to claim 15, wherein a plurality of images

having different focal points are captured with one shutter operation (see column 4, lines

35-40: The frames are taken together as one unit, which it equivalent to one shutter

operation).

Claim Rejections - 35 USC § 103

3.   The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all

obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in
> section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are
> such that the subject matter as a whole would have been obvious at the time the invention was made to a person
> having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the
> manner in which the invention was made.

4.   **Claims 2 and 3 are rejected under 35 U.S.C. 103(a) as being unpatentable over**

Kubota et al. (IEICE 1999) in view of Pieters et al., US 3,743,772.

In regard to claim 2, Kubota et al. (IEICE 1999) discloses the arbitrarily focused

image synthesizing apparatus according to claim 1. The Kubota reference does not

disclose comprising:

a brightness compensator for performing brightness correction in image

block units so that the brightness of said first image and of said second image

become about the same, and supplying said images after brightness correction to

said first filter and said second filter.

Pieters et al., US 3,743,772, discloses a brightness correction method that divides the areas of imaged region into a matrix of blocks and stores brightness information for center point of each block (see column 2, lines 16-57). By interpolating between center points of the four adjacent regions to the region to correct, any point in that region can be corrected (see column 2, line 57-64).

It would have been obvious to one of ordinary skill in the art to have been motivated to modify Kubota et al. (IEICE 1999) in view of Pieters et al., US 3,743,772, to have a brightness compensator that performs the brightness correction method on each image so they are made about the same, before entering the filters, in order to be able to correct the brightness of each pixel in the image without having to save brightness information for each pixel, thus reducing the amount of memory space needed.

In regard to claim 3, Kubota et al. (IEICE 1999) in view of Pieters et al., US 3,743,772, discloses the arbitrarily focused image synthesizing apparatus according to claim 2. The Pieters reference discloses that the brightness compensator uses correction parameters of the block for the center pixel in each block and uses interpolated correction parameters for the other pixels so as to reduce the variation in correction between the blocks (see column 2, lines 48-64).

5.   **Claim 5 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kubota et al. (IEICE 1999) in view of Kubota et al. (IEEE 1999).**

In regard to claim 5, Kubota et al. (IEICE 1999) in view of Pieters et al., US 3,743,772, discloses the arbitrarily focused image synthesizing apparatus according to claim 1, Kubota (IEICE 1999) does not disclose further comprising:

a positioning unit that orders each of said first image and said second

image hierarchically according to resolution, estimates parameters of differences

in the rotation, resizing, and translation in said first image and said second image

over a wide search range at a level where the resolution is low, performing

matching at each level from upper level to lower level sequentially, while limiting

the search range to the margins of the parameters estimated at the upper level,

finds the parameters between said first image and said second image so as to

position said first image and said second image, and supplying positioned images

to said first filter and said second filter.

Kubota et al. (IEEE 1999) discloses a method between near-focused and far-

focused images which are translated, scaled and rotated with respect to each other (see

pg.447, sec. 2.1, para. 1). Gaussian pyramids are generated for both images with the

highest resolution at the bottom and lowest resolution at the top level (see figure 1 and

pg. 447-448, sec 2.1).

It would have been obvious to one of ordinary skill in the art to have been

motivated to modify Kubota et al. (IEICE 1999) in view of Kubota et al. (IEEE 1999), to

have the positioning unit as claimed in claim 5, in order estimate the difference of the

images with higher accuracy, as well as reduce the computational cost as taught by

Kubota.

6.   **Claim 10 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kubota et al.**
(IEICE 1999).

In regard to claim 10, Official Notice is taken it is well known in the art that when creating an arbitrarily focused image, one image is a near content in-focus image in which near scenic content is focused and the other image is a far content in-focus image in which far scenic content is focused because when both objects are in-focus in the scene, there is no need to make the composite image. Therefore, it would have been obvious to one of ordinary skill in the art to have been motivated to configure Kubota et al. (IEICE 1999) to have the first image is a near content in-focus image in which near scenic content is focused and the second image is a far content in-focus image in which far scenic content is focused because when both objects are in-focus in the scene, there is no need to make the composite image.

7.   **Claim 14 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kinjo, US 6,583,811 in view of Kubota et al. (IEEE 1999).**

In regard to claim 14, Kinjo, US 6,583,811, discloses the arbitrarily focused image synthesizing apparatus according to claim 13, wherein said determinator comprises:

a differential processor for finding differential values of said plurality of images in front and back (see column 7, lines 16-20); and

an estimator for estimating said parameters by finding the value at which said differential value is minimized (see column 7, lines 19-22).

The Kinjo reference does not disclose a Gaussian filter for subjecting said i'th image to filter processing while varying parameters.

Kubota et al. (IEEE 1999) discloses a method between near-focused and far-focused images which are translated, scaled and rotated with respect to each other (see pg.447, sec. 2.1, para. 1). Gaussian pyramids are generated for both images with the highest resolution at the bottom and lowest resolution at the top level (see figure 1 and pg. 447-448, sec 2.1).

It would have been obvious to one of ordinary skill in the art to have been motivated to modify Kinjo, US 6,583,811, in view of Kubota et al. (IEEE 1999), to have the Gaussian pyramid method that subjects the images to filter processing while varying parameters, in order estimate the difference of the images with higher accuracy, as well as reduce the computational cost as taught by Kubota.

8.   **Claim 17 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kinjo, US 6,583,811, in view of Kubota et al. (IEEE 1999) and Pieters et al., US 3,743,772.**

In regard to claim 17, Kinjo, US 6,583,811, discloses the plural image simultaneous capturing camera according to claim 15. The Kinjo reference does not disclose further comprising an arbitrarily focused image synthesizing apparatus comprising:

a first filter;

a second filter;

a synthesizer; and

a brightness compensator.

Kubota et al. (IEICE 1999) discloses an arbitrarily focused image synthesizing apparatus comprising:

a first filter (see figure 4, element Ka) for converting a first image that is

in focus in a first portion based on a given first blur parameter (see page 6, last

line to page 7 first line);

a second filter (see figure 4, element Kb) for converting a second image

that is in focus in a second portion based on a given second blur parameter (see

page 6, last line to page 7 first line); and

a synthesizer (adder) for synthesizing output of said first filter and output

of said second filter and generating an arbitrarily focused image (see page 6, last

line to page 7 first line).

The Kubota reference does not disclose a brightness compensator.

Pieters et al., US 3,743,772, discloses a brightness correction method that divides

the areas of imaged region into a matrix of blocks and storing brightness information for

center point of each block (see column 2, lines 16-57). By interpolating between center

points of the four adjacent regions to the region to correct, any point in that region can be

corrected (see column 2, line 57-64).

It would have been obvious to one of ordinary skill in the art to have been

motivated to modify Kinjo, US 6,583,811, in view of Kubota et al. (IEEE 1999), and

Pieters et al., US 3,743,772, to have the arbitrarily focused image synthesizing apparatus

as claimed in claim 17, in order to be able to correct the brightness of each pixel in the

image without having to save brightness information for each pixel, thus reducing the

amount of memory space needed and to create a composite image of a screen wherein the

whole image is in focus, giving a high quality image.

Allowable Subject Matter

9.   Claims 4, 6 –9, and 18-20 objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

In regard to claims 4 and 18, the prior art does not disclose an image synthesizing apparatus with a positioning unit that positions said first image and said second image, based on a brightness distribution obtained by projecting image data in horizontal and vertical directions.

In regard to claims 6-9 and 19, the prior art does not disclose an image synthesizing apparatus wherein the synthesizer synthesizes output from a first filter and a special effects filter.

Conclusion

10.   The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. The following art discloses imaging synthesizing apparatuses that create in-focus composite images:
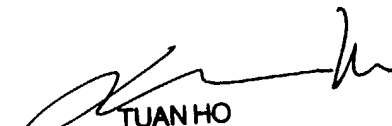
US 5,488,674,

US 6,201,899,

US 5,172,236,

US 6,320,979.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Gevell Selby whose telephone number is 703-305-8623. The examiner can normally be reached on 8:00 A.M. - 5:30 PM (every other Friday off).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Andrew Christensen can be reached on 703-308-9644. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

gvs

TUAN HO
PRIMARY EXAMINER